

020732-208.537 CIP (7496)

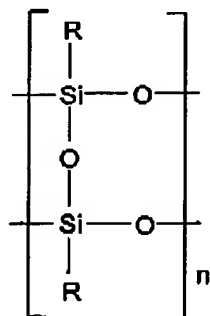
**Section I. (Amendments to the Claims)**

Please amend claims 18, 19, 69 and 70, and cancel claims 112 and 115, as set out below in the listing of claims 1-126 of the application.

1. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a precursor of the material to be deposited on the substrate, wherein said precursor includes a metal atom, and wherein said material to be deposited comprises a material selected from the group consisting of high-k material, copper diffusion barrier material, nitride material, metal nitride material, barrier layer material, oxynitride barrier layer material, nitride barrier layer material, silicide barrier layer material, and copper seed layer material, with the proviso that when the material to be deposited comprises the copper seed layer material, the precursor comprises at least one copper precursor selected from the group consisting of copper (II) carboxylates, copper (I) cyclopentadienes, copper (I) phenyls, copper (I) amides, and Lewis base adducts of the aforementioned copper (I) species.
2. (Original) The deposition composition of claim 1, wherein the supercritical fluid comprises a fluid selected from the group consisting of: carbon dioxide, oxygen, argon, krypton, xenon, ammonia, methane, ethane, methanol, ethanol, isopropanol, dimethyl ketone, sulfur hexafluoride, carbon monoxide, dinitrogen oxide, forming gas, hydrogen, and mixtures thereof.
3. (Original) The deposition composition of claim 1, wherein the supercritical fluid comprises carbon dioxide.
4. (Original) The deposition composition of claim 1, wherein said composition comprises a co-solvent.
5. (Original) The deposition composition of claim 1, consisting essentially of said supercritical fluid and said precursor.
6. (Original) The deposition composition of claim 1, consisting of said supercritical fluid and said precursor.
7. (Original) The deposition composition of claim 1, wherein said precursor comprises a barrier layer precursor for forming a metal nitride or metal oxynitride barrier layer.

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8. (Original) The deposition composition of claim 7, wherein said metal nitride or metal oxynitride comprises at least one metal selected from the group consisting of tantalum, titanium, silicon, tungsten and molybdenum.
9. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a silicon precursor of the material to be deposited on the substrate, wherein the silicon precursor comprises a cyclosiloxane.
10. (Previously Presented) The deposition composition of claim 9, wherein said material deposited on the substrate is a low k organosilicate material.
11. (Previously Presented) The deposition composition of claim 9, wherein the cyclosiloxane precursor comprises a siloxane selected from the group consisting of tetramethylcyclotetrasiloxane (TMCTS) and octamethyltetracyclosiloxane (OMCTS).
12. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid, a silicon precursor of the material to be deposited on the substrate, and cube monomers, wherein the silicon precursor comprises a silsesquioxane having the formula:



wherein each R is independently selected from H, C<sub>1</sub>-C<sub>8</sub> alkyl, C<sub>1</sub>-C<sub>8</sub> alkenyl, C<sub>6</sub>-C<sub>10</sub> aryl and C<sub>1</sub>-C<sub>8</sub> alkoxy.

13. (Cancelled)

14. (Previously Presented) The deposition composition of claim 12, wherein said material deposited on

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the substrate is a mesoporous organo-functionalized silsesquioxane (SSQ) material.

15. (Cancelled)
16. (Previously Presented) The deposition composition of claim 12, wherein the cube monomers have epoxy and hexyl groups attached to a same cluster of the monomer.
17. (Previously Presented) The deposition composition of claim 1, wherein said precursor comprises a precursor for forming a high k material on the substrate at deposition temperature below 300°C, said precursor comprising a metal and an organo moiety.
18. (Currently Amended) The deposition composition of claim 17, wherein the metal is selected from the group consisting of Ba, Sr, La, ~~Ti, Zr, Ta~~ and Pb, and wherein the organo moiety is selected from the group consisting of C<sub>1</sub>-C<sub>8</sub> alkoxides,  $\beta$ -diketonates, carbonates, hydroxides, acetates, formates, nitrates, halides, C<sub>6</sub>-C<sub>10</sub> aryls, C<sub>1</sub>-C<sub>8</sub> alkyls, and mixtures of two or more of the foregoing that when the metal is Ti, Ta, or Zr, the organo moiety cannot be C<sub>1</sub>-C<sub>8</sub> alkoxides or  $\beta$ -diketonates.
19. (Currently Amended) The deposition composition of claim 17, wherein the metal is selected from the group consisting of Ti, Zr and Ta, and wherein the organo moiety is selected from the group consisting of C<sub>4</sub>-C<sub>8</sub> alkoxides,  $\beta$ -diketonates, carbonates, hydroxides, acetates, formates, nitrates, halides, C<sub>6</sub>-C<sub>10</sub> aryls, C<sub>1</sub>-C<sub>8</sub> alkyls, and mixtures of two or more of the foregoing, with the proviso that when the organo moiety is C<sub>1</sub>-C<sub>8</sub> alkoxide or  $\beta$ -diketonate, the metal cannot be Ta, Ti or Zr.
20. (Original) The deposition composition of claim 1, wherein the precursor comprises an organometallic compound selected from the group consisting of tetraphenyl lead and triphenyl bismuth.
21. (Original) The deposition composition of claim 1, comprising a solvent/co-solvent species selected from the group consisting of carbon dioxide, water, ammonia and alcohols.
22. (Original) The deposition composition of claim 1, wherein the supercritical fluid comprises ammonia.
23. (Original) The deposition composition of claim 22, wherein the precursor comprises a precursor for

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forming a nitride material on the substrate.

24. (Original) The deposition composition of claim 23, wherein the precursor has a decomposition temperature below 200°C.
25. (Original) The deposition composition of claim 24, wherein the precursor comprises a non-oxide metal-containing precursor.
26. (Original) The deposition composition of claim 1, wherein the supercritical fluid comprises carbon dioxide and the precursor comprises a precursor for forming a metal nitride material on the substrate.
27. (Original) The deposition composition of claim 1, wherein the precursor comprises a precursor for forming a copper diffusion barrier material on the substrate.
28. (Original) The deposition composition of claim 27, wherein the copper diffusion barrier material comprises a material selected from the group consisting of tantalum (Ta), tantalum nitride ( $TaN_x$ ), tantalum silicon nitride ( $TaSiN$ ), titanium nitride ( $TiN_x$ ), titanium silicon nitride ( $TiSiN$ ), tungsten nitride ( $WN_x$ ) and molybdenum nitride ( $MoN_x$ ), wherein x is equal to the valency of the metal species in the nitride compound.
29. (Original) The deposition composition of claim 27, wherein the copper diffusion barrier material comprises an amorphous material.
30. (Original) The deposition composition of claim 28, wherein the copper diffusion barrier material comprises an amorphous material.
31. (Original) The deposition composition of claim 28, wherein the copper diffusion barrier material comprises a material selected from the group consisting of ( $TaN_x$ ) and titanium nitride ( $TiN_x$ ).
32. (Original) The deposition composition of claim 28, wherein the copper diffusion barrier material comprises  $TaSiN$ .
33. (Original) The deposition composition of claim 28, wherein the copper diffusion barrier material

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comprises a material selected from the group consisting of tungsten nitride ( $WN_x$ ) and molybdenum nitride ( $MoN_x$ ).

34. (Previously Presented) The deposition composition of claim 1, wherein the material comprises a barrier layer material and the precursor comprises at least one precursor selected from the group consisting of metal alkylamides and metal carbonyls.
35. (Previously Presented) The deposition composition of claim 1, wherein the material comprises a barrier layer material and the precursor comprises at least one precursor selected from the group consisting of tantalum (V) tetraethoxyacetylacetonate; tantalum (V) (tetraethoxy); tris(2,2,6,6-tetramethyl-3,5-heptanedionato) titanium (III); tantalum (V) trifluoroethoxide; pentakis(dimethylamino) tantalum (V); pentakis(ethyl-methylamino) tantalum (V); tetrakis(diethylamino) titanium; tetrakis(dimethylamino) titanium;  $Mo(CO)_6$  and  $W(CO)_6$ .
36. (Original) The deposition composition of claim 1, wherein the material comprises an oxynitride barrier layer material and the precursor comprises at least one precursor selected from the group consisting of metal  $\beta$ -diketonates and metal alkoxides.
37. (Original) The deposition composition of claim 1, wherein the material comprises a nitride barrier layer material and the precursor comprises at least one precursor selected from the group consisting of metal alkylamides.
38. (Original) The deposition composition of claim 1, wherein the material comprises a silicide barrier layer material and the precursor comprises at least one silicon-containing precursor.
39. (Original) The deposition composition of claim 38, wherein the at least one silicon-containing precursor comprises a precursor species selected from the group consisting of silane and t-butyl silane.
40. (Cancelled)
41. (Previously Presented) The deposition composition of claim 1, wherein the precursor comprises a metal complex including at least one ligand selected from the group consisting of carboxylates, cyclopentadiene, phenyls, and amides.

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42. (Original) The deposition composition of claim 41, wherein the metal complex is fluorine-free.
43. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a precursor of the material to be deposited on the substrate, wherein the precursor comprises at least one copper precursor selected from the group consisting of

- (1) Cu(pentafluorophenyl) pentamer
- (2) Cu(thd)<sub>2</sub>
- (3) Cu(dmhd)<sub>2</sub>
- (4) Cu(bzac)<sub>2</sub>
- (5) Cu(CHB)<sub>2</sub>
- (6) Cu(oxalate)
- (7) Cu(formate)<sub>2</sub>
- (8) Cu(acetate)<sub>2</sub>
- (9) (VTMS)Cu(hfac)
- (10) Cu(tod)<sub>2</sub>
- (11) CpCuPMe<sub>3</sub>
- (12) Cu(dibm)<sub>2</sub>
- (13) (CO)CuCl
- (14) (VCH)Cu(hfac)
- (15) Cu(tfbzm)<sub>2</sub>
- (16) (MHY)Cu(hfac)
- (17) (COD)Cu(hfac)
- (18) (DMCOD)Cu(hfac)

wherein:

bzac = 1-phenylpentane-1,3-dionate

COD = cyclooctadiene

dibm = 2,6-dimethylheptane-3,5-dionate

dmhd = 1,1-dimethylhexane-3,5-dionate

MHY = 2-methyl-1-hexene-3-yne

tfbzm = 1,1,1-trifluoro-4-phenylbutane-2,4-dionate

thd = 2,2,6,6-tetramethylheptane-3,5-dionate

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tod = 2,2,7-trimethyloctane-3,5-dionate

VCH = vinylcyclohexane

CHB = cyclohexanebutyrate

VTMS = vinyltrimethylsilane.

44. (Previously Presented) The deposition composition of claim 1, wherein the precursor comprises a copper (II) precursor, and the composition further comprises isopropyl alcohol.
45. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a precursor of the material to be deposited on the substrate, wherein the material to be formed on the substrate consists essentially of a noble metal and/or a noble metal oxide, and wherein the precursor comprises a metal precursor selected from the group consisting of
- (i) metal carbonyls;
  - (ii) metal ( $\beta$ -diketonate)<sub>x</sub>•L wherein x = 1, 2 or 3 and L = Lewis base ligand; and
  - (iii) mixed ligand compounds.
46. (Previously Presented) The deposition composition of claim 45, wherein the noble metal and/or noble metal oxide comprises a metal/metal oxide species selected from the group consisting of platinum (Pt), iridium oxide (IrO<sub>2</sub>), ruthenium oxide (RuO<sub>2</sub>), palladium (Pd), and silver (Ag).
47. (Cancelled)
48. (Cancelled)
49. (Previously Presented) The deposition composition of claim 45, wherein the supercritical fluid comprises supercritical carbon dioxide.
50. (Previously Presented) The deposition composition of claim 45, wherein the metal ( $\beta$ -diketonate)<sub>x</sub>•L precursor comprises

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(1,5-cyclooctadiene)Ir(I)(acac);

tris(norbornadiene)Ir(III)(acac);

(vinyltriethylsilane)Ag(I)(hexafluoroacetylacetonato); and

bis(2,2,6,6-tetramethyl-3,5-heptanedionato)Ru(II)(1,5-cyclooctadiene).

51. (Previously Presented) The deposition composition of claim 45, wherein the precursor comprises a mixed ligand composition including a compound selected from the group consisting of

(CH<sub>3</sub>)<sub>2</sub>Au(III)(acac);

tetrakis-(triphenylphosphine)platinum (0);

trimethyl-methylcyclopentadienyl platinum (IV); and

tricarbonyl-methylcyclopentadienyl platinum (I).

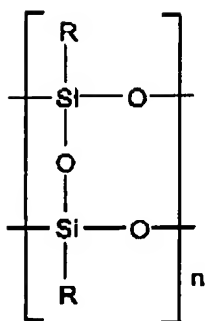
52. (Previously Presented) A method of forming a material on a substrate, comprising depositing the material on the substrate from a deposition composition comprising a precursor of said material, and a supercritical fluid, wherein said precursor includes a metal atom, and wherein said material to be deposited comprises a material selected from the group consisting of high-k material, copper diffusion barrier material, nitride material, metal nitride material, barrier layer material, oxynitride barrier layer material, nitride barrier layer material, silicide barrier layer material, and copper seed layer material, with the proviso that when the material to be deposited comprises the copper seed layer material, the precursor comprises at least one copper precursor selected from the group consisting of copper (II) carboxylates, copper (I) cyclopentadienes, copper (I) phenyls, copper (I) amides, and Lewis base adducts of the aforementioned copper (I) species.
53. (Original) The method of claim 52, wherein the supercritical fluid comprises a fluid selected from the group consisting of: carbon dioxide, oxygen, argon, krypton, xenon, ammonia, methane, ethane, methanol, ethanol, isopropanol, dimethyl ketone, sulfur hexafluoride, carbon monoxide, dinitrogen oxide, forming gas, hydrogen, and mixtures thereof.



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54. (Original) The method of claim 52, wherein the supercritical fluid comprises carbon dioxide.
55. (Original) The method of claim 52, wherein said composition comprises a co-solvent.
56. (Original) The method of claim 52, wherein the deposition composition consists essentially of said supercritical fluid and said precursor.
57. (Original) The method of claim 52, wherein the deposition composition consists of said supercritical fluid and said precursor.
58. (Original) The method of claim 52, wherein said precursor comprises a barrier layer precursor for forming a metal nitride or metal oxynitride barrier layer.
59. (Original) The method of claim 58, wherein said metal nitride or metal oxynitride comprises at least one metal selected from the group consisting of tantalum, titanium, silicon, tungsten and molybdenum.
60. (Previously Presented) A method of forming a material on a substrate, comprising depositing the material on the substrate from a deposition composition comprising a silicon precursor of said material and a supercritical fluid, wherein the silicon precursor comprises a cyclosiloxane.
61. (Previously Presented) The method of claim 60, wherein said material deposited on the substrate is a low k organosilicate material.
62. (Previously Presented) The method of claim 60, wherein the cyclosiloxane precursor comprises a siloxane selected from the group consisting of tetramethylcyclotetrasiloxane (TMCTS) and octamethyltetracyclosiloxane (OMCTS).
63. (Previously Presented) A method of forming a material on a substrate, comprising depositing the material on the substrate from a deposition composition comprising a silicon precursor of said material, a supercritical fluid, and cube monomers, wherein the silicon precursor comprises a silsesquioxane having the formula:

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wherein each R is independently selected from H, C<sub>1</sub>-C<sub>8</sub> alkyl, C<sub>1</sub>-C<sub>8</sub> alkenyl, C<sub>6</sub>-C<sub>10</sub> aryl and C<sub>1</sub>-C<sub>8</sub> alkoxy.

64. (Cancelled)
65. (Previously Presented) The method of claim 63, wherein said material deposited on the substrate is a mesoporous organo-functionalized silsesquioxane (SSQ) material.
66. (Cancelled)
67. (Previously Presented) The method of claim 63, wherein cube monomers have epoxy and hexyl groups attached to a same cluster of the monomer.
68. (Previously Presented) The method of claim 52, wherein said precursor comprises a precursor for forming a high k material on the substrate at deposition temperature below 300°C, said precursor comprising a metal and an organo moiety.
69. (Currently Amended) The method of claim 68, wherein the metal is selected from the group consisting of Ba, Sr, La, Ti, Zr, Ta and Pb, and wherein the organo moiety is selected from the group consisting of C<sub>1</sub>-C<sub>8</sub> alkoxides, β-diketonates, carbonates, hydroxides, acetates, formates, nitrates, halides, C<sub>6</sub>-C<sub>10</sub> aryls, C<sub>1</sub>-C<sub>8</sub> alkyls, and mixtures of two or more of the foregoing with the proviso that when the metal is Ti, Ta, or Zr, the organo moiety cannot be C<sub>1</sub>-C<sub>8</sub> alkoxides or β-diketonates.
70. (Currently Amended) The method of claim 68, wherein the metal is selected from the group consisting of Ti, Zr and Ta, and wherein the organo moiety is selected from the group consisting of

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~~C<sub>1</sub>-C<sub>8</sub> alkoxides,  $\beta$ -diketonates~~, carbonates, hydroxides, acetates, formates, nitrates, halides, C<sub>6</sub>-C<sub>10</sub> aryls, C<sub>1</sub>-C<sub>8</sub> alkyls, and mixtures of two or more of the foregoing, with the proviso that when the organo moiety is C<sub>1</sub>-C<sub>8</sub> alkoxide or  $\beta$ -diketonate, the metal cannot be Ta, Ti or Zr.

71. (Original) The method of claim 52, wherein the precursor comprises an organometallic compound selected from the group consisting of tetraphenyl lead and triphenyl bismuth.
72. (Original) The method of claim 52, comprising a solvent/co-solvent species selected from the group consisting of carbon dioxide, water, ammonia and alcohols.
73. (Original) The method of claim 52, wherein the supercritical fluid comprises ammonia.
74. (Original) The method of claim 52, wherein the precursor comprises a precursor for forming a nitride material on the substrate.
75. (Original) The method of claim 74, wherein the precursor has a decomposition temperature below 200°C.
76. (Original) The method of claim 75, wherein the precursor comprises a non-oxide metal-containing precursor.
77. (Original) The method of claim 52, wherein the supercritical fluid comprises carbon dioxide and the precursor comprises a precursor for forming a metal nitride material on the substrate.
78. (Original) The method of claim 52, wherein the precursor comprises a precursor for forming a copper diffusion barrier material on the substrate.
79. (Original) The method of claim 78, wherein the copper diffusion barrier material comprises a material selected from the group consisting of tantalum (Ta), tantalum nitride (TaN<sub>x</sub>), tantalum silicon nitride (TaSiN), titanium nitride (TiN<sub>x</sub>), titanium silicon nitride (TiSiN), tungsten nitride (WN<sub>x</sub>) and molybdenum nitride (MoN<sub>x</sub>), wherein x is equal to the valency of the metal species in the nitride compound.
80. (Original) The method of claim 78, wherein the copper diffusion barrier material comprises an

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amorphous material.

81. (Original) The method of claim 79, wherein the copper diffusion barrier material comprises an amorphous material containing silicon.
82. (Original) The method of claim 79, wherein the copper diffusion barrier material comprises a material selected from the group consisting of (TaN<sub>x</sub>) and titanium nitride (TiN<sub>x</sub>).
83. (Original) The method of claim 79, wherein the copper diffusion barrier material comprises TaSiN.
84. (Original) The method of claim 79, wherein the copper diffusion barrier material comprises a material selected from the group consisting of tungsten nitride (WN<sub>x</sub>) and molybdenum nitride (MoN<sub>x</sub>).
85. (Previously Presented) The method of claim 52, wherein the material comprises a barrier layer material and the precursor comprises at least one precursor selected from the group consisting of metal alkylamides and metal carbonyls.
86. (Previously Presented) The method of claim 52, wherein the material comprises a barrier layer material and the precursor comprises at least one precursor selected from the group consisting of tantalum (V) tetraethoxyacetylacetonate; tantalum (V) (tetraethoxy); tris(2,2,6,6-tetramethyl-3,5-heptanedionato) titanium (III); tantalum (V) trifluoroethoxide; pentakis(dimethylamino) tantalum (V); pentakis(ethyl-methylamino) tantalum (V); tetrakis(diethylamino) titanium; tetrakis(dimethylamino) titanium; Mo(CO)<sub>6</sub> and W(CO)<sub>6</sub>.
87. (Original) The method of claim 52, wherein the material comprises an oxynitride barrier layer material and the precursor comprises at least one precursor selected from the group consisting of metal  $\beta$ -diketonates and metal alkoxides.
88. (Original) The method of claim 52, wherein the material comprises a nitride barrier layer material and the precursor comprises at least one precursor selected from the group consisting of metal alkylamides.
89. (Original) The method of claim 52, wherein the material comprises a silicide barrier layer material

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and the precursor comprises at least one silicon-containing precursor.

90. (Original) The method of claim 89, wherein the at least one silicon-containing precursor comprises a precursor species selected from the group consisting of silane and t-butyl silane.
91. (Cancelled)
92. (Previously Presented) The method of claim 52, wherein the precursor comprises a metal complex including at least one ligand selected from the group consisting of carboxylates, cyclopentadiene, phenyls, and amides.
93. (Original) The method of claim 92, wherein the metal complex is fluorine-free.
94. (Previously Presented) A method of forming a material on a substrate, comprising depositing the material on the substrate from a deposition composition comprising a precursor of said material, and a supercritical fluid, wherein the precursor comprises at least one copper precursor selected from the group consisting of
- (1) Cu(pentafluorophenyl) pentamer
  - (2) Cu(thd)<sub>2</sub>
  - (3) Cu(dmhd)<sub>2</sub>
  - (4) Cu(bzac)<sub>2</sub>
  - (5) Cu(CHB)<sub>2</sub>
  - (6) Cu(oxalate)
  - (7) Cu(formate)<sub>2</sub>
  - (8) Cu(acetate)<sub>2</sub>
  - (9) (VTMS)Cu(hfac)
  - (10) Cu(tod)<sub>2</sub>
  - (11) CpCuPMe<sub>3</sub>
  - (12) Cu(dibm)<sub>2</sub>
  - (13) (CO)CuCl
  - (14) (VCH)Cu(hfac)
  - (15) Cu(tfbzm)<sub>2</sub>
  - (16) (MHY)Cu(hfac)

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(17) (COD)Cu(hfac)

(18) (DMCOD)Cu(hfac)

wherein:

bzac = 1-phenylpentane-1,3-dionate

COD = cyclooctadiene

dibm = 2,6-dimethylheptane-3,5-dionate

dmhd = 1,1-dimethylhexane-3,5-dionate

MHY = 2-methyl-1-hexene-3-yne

tfbzm = 1,1,1-trifluoro-4-phenylbutane-2,4-dionate

thd = 2,2,6,6-tetramethylheptane-3,5-dionate

tod = 2,2,7-trimethyloctane-3,5-dionate

VCH = vinylcyclohexane

CHB = cyclohexanebutyrate

VTMS = vinyltrimethylsilane.

95. (Previously Presented) The method of claim 52, wherein the precursor comprises a copper (II) precursor, and the composition further comprises isopropyl alcohol.
96. (Previously Presented) A method of forming a material on a substrate, comprising depositing the material on the substrate from a deposition composition comprising a precursor of said material, and a supercritical fluid wherein the material to be formed on the substrate consists essentially of a noble metal and/or a noble metal oxide, and wherein the precursor comprises a metal precursor selected from the group consisting of
- (i) metal carbonyls;
  - (ii) metal ( $\beta$ -diketonate)<sub>x</sub>•L wherein x = 1, 2 or 3 and L = Lewis base ligand; and
  - (iii) mixed ligand compounds.
97. (Previously Presented) The method of claim 96, wherein the noble metal and/or noble metal oxide comprises a metal/metal oxide species selected from the group consisting of platinum (Pt), iridium oxide (IrO<sub>2</sub>), ruthenium oxide (RuO<sub>2</sub>), palladium (Pd), and silver (Ag).

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98. (Cancelled)

99. (Cancelled)

100. (Previously Presented) The method of claim 96, wherein the supercritical fluid comprises supercritical carbon dioxide.

101. (Previously Presented) The method of claim 96, wherein the metal ( $\beta$ -diketonate)<sub>x</sub>·L precursor comprises

(1,5-cyclooctadiene)Ir(I)(acac);

tris(norbornadiene)Ir(III)(acac);

(vinyltriethylsilane)Ag(I)(hexafluoroacetylacetonato); and

bis(2,2,6,6-tetramethyl-3,5-heptanedionato)Ru(II)(1,5-cyclooctadiene).

102. (Previously Presented) The method of claim 96, wherein the precursor comprises a mixed ligand composition including a compound selected from the group consisting of

(CH<sub>3</sub>)<sub>2</sub>Au(III)(acac);

tetrakis-(triphenylphosphine)platinum (0);

trimethyl-methylcyclopentadienyl platinum (IV); and

tricarbonyl-methylcyclopentadienyl platinum (I).

103. (Original) A method of forming a low k organosilicate film on a substrate, comprising contacting the substrate with a deposition composition comprising an organosilicon compound and a supercritical fluid, to deposit a silicon-containing material on the substrate, and vitrifying the silicon-containing material to form said low k organosilicate film as a porous organosilicate film on the substrate.

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104. (Original) The method of claim 103, comprising controlling the porosity of the porous organosilicate film to yield the porous organosilicate film as a film having a predetermined dielectric constant.
105. (Original) The method of claim 104, wherein porosity is controlled by controlled incorporation of air bubbles in the silicon-containing material deposited on the substrate.
106. (Original) A method of forming a barrier layer on a substrate, comprising contacting the substrate in a contacting zone with a deposition composition comprising a barrier layer precursor and a supercritical fluid, and continuing said contacting while flowing the deposition composition into the contacting zone, and discharging contacted deposition composition from said contacting zone, to effect growth of the barrier layer to a predetermined thickness.
107. (Cancelled)
108. (Cancelled)
109. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a precursor of the material to be deposited on the substrate, wherein said precursor is selected from the group consisting of: a barrier layer precursor for forming a metal nitride barrier layer; a barrier layer precursor for forming a metal silicon nitride barrier layer; a barrier layer precursor for forming a metal oxynitride barrier layer; a precursor for forming a high k material on the substrate at deposition temperature below 300°C; tetraphenyl lead; triphenyl bismuth; a precursor for forming a copper diffusion barrier material on the substrate; and at least one copper precursor selected from the group consisting of copper (II) carboxylates, copper (I) cyclopentadienes, copper (I) phenyls, copper (I) amides, and Lewis base adducts of the aforementioned copper (I) species.
110. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a silicon precursor, wherein the silicon precursor comprises at least one siloxane and at least one alkylsilane.
111. (Previously Presented) The deposition composition of claim 110, wherein the alkylsilane comprises a silane selected from the group consisting of trimethylsilane and tetramethylsilane.



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112. (Cancelled)

113. (Previously Presented) A method of forming a material on a substrate, comprising depositing the material on the substrate from a deposition composition comprising a silicon precursor, and a supercritical fluid, wherein the silicon precursor comprises at least one siloxane and at least one alkylsilane.

114. (Previously Presented) The method of claim 113, wherein the alkylsilane comprises a silane selected from the group consisting of trimethylsilane and tetramethylsilane.

115. (Cancelled)

116. (Previously Presented) A deposition composition for depositing material on a substrate, said deposition composition comprising a supercritical fluid and a precursor of the material to be deposited on the substrate, wherein said precursor comprises a metal complex including at least one ligand selected from the group consisting of carboxylates, cyclopentadiene, phenyls, and amides.

117. (Previously Presented) The deposition composition of claim 9, further comprising a porogen.

118. (Previously Presented) The deposition composition of claim 117, wherein said material deposited on the substrate is a porous low k film precursor.

119. (Previously Presented) The method of claim 60, wherein the deposition composition further comprises a porogen.

120. (Previously Presented) The method of claim 119, wherein said material deposited on the substrate is a porous low k film precursor.

121. (Previously Presented) The method of claim 120, further comprising treating said material deposited on said substrate to form a porous low k film.

122. (Previously Presented) A method of manufacturing a semiconductor comprising depositing a material on a substrate using the deposition composition of claim 1, wherein said semiconductor comprises said substrate.

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123. (Previously Presented) A method of manufacturing a semiconductor comprising depositing a material on a substrate using the deposition composition of claim 9, wherein said semiconductor comprises said substrate.
124. (Previously Presented) A method of manufacturing a semiconductor comprising depositing a material on a substrate using the deposition composition of claim 12, wherein said semiconductor comprises said substrate.
125. (Previously Presented) A method of manufacturing a semiconductor comprising depositing a material on a substrate using the deposition composition of claim 43, wherein said semiconductor comprises said substrate.
126. (Previously Presented) A method of manufacturing a semiconductor comprising depositing a material on a substrate using the deposition composition of claim 45, wherein said semiconductor comprises said substrate.